

AN OVERVIEW OF ISSUES IN THE VOWEL SYSTEM AND VOWEL HARMONY OF KOREAN — Disharmony among the Hypotheses of Vowel Harmony — *

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To discuss vowel harmony in Korean it is worthwhile to review vowel systems at several stages of the Korean language, beginning with the simple vowel system of Late Middle Korean. However, the establishment of this system has been a controversial topic. Three types of vowel harmony, i.e. horizontal, vertical, and diagonal harmony, will be discussed in relation to this vowel system. As most of the Altaic languages to which Korean seems to belong have vertical (palatal) harmony, it is likely that the vertical system is agreeable to Middle Korean. However, because of the supposed vowel shift in Early Middle Korean a 'quasi-diagonal' but virtually 'vertical' harmony should be suggested. This type of harmony is typologically idiosyncratic and worth further study.

Other issues in Korean vowel harmony include problems with neutral vowels and vowel harmony rules. Partial neutrality and preliminary formulation of vowel harmony rules are introduced. In addition, the aspect of vowel disharmony is also investigated.

As an appendix, a claim that vowel harmony existed in *Hyangga* (old Korean song) is investigated in detail. It is concluded that it is not a good preconception to claim that the old stage of Korean phonology had a more complete system of vowel harmony than the later stage.

1. The Simple Vowel System of Late Middle Korean and its Vowel Harmony

The vowel system is the preliminary basis for the study of vowel harmony (henceforth, VH) in a certain language. Therefore, to discuss VH in Korean it is worthwhile to review vowel systems at several stages of the Korean language, beginning with the simple vowel system of Late Middle Korean (henceforth, LMK) from the fifteenth to the sixteenth century.

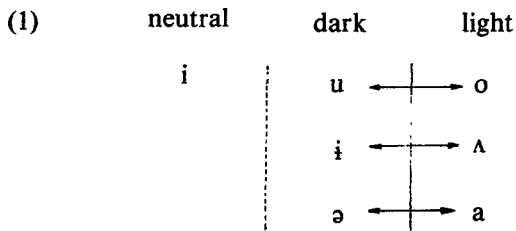
The establishment of a vowel system for LMK is a rather controversial topic amongst phonologists. In fact, there are principally five different systems suggested by more than a dozen scholars, including two Japanese phonologists. I will show their vowel charts in order of date of first appearance in literature if possible, and

*This paper is designed principally for non-Korean speakers who have little background in this topic. Therefore, the first part of this article on patterns of vowel arrangement is of necessity quite lengthy. I also planned to present my analysis of vowel harmony & disharmony in detail, but as space here is limited, I shall offer more on this subject in a later article. In this article, however, I have provided just some preliminary views and in advance a full bibliography on vowel harmony for further study.

I would like to thank Thomas Robb for his reading the earlier version of my manuscript. He was the first linguist who ever suggested to me the feature [+ATR] for the analysis of LMK in the 1977 Hawaii Summer Linguistic Institute of LSA. In addition, I appreciate the advice of Bruce Hayes, Harry van der Hulst and Werner Sasse; and the assistance of Alistair Staddon and E.-Y. Lee.

also overlap the system of VH on the same diagram by using — for a boundary between two groups of opposing vowels in harmonic pairs and ----- for separating out a neutral vowel from others. \longleftrightarrow denotes harmonic pairs.

In order to relate vowel systems to the VH system, let us first look at the VH system of LMK.



Of these seven vowels, *o* ʌ *a* have been called 'light'(yang 陽) vowels, and *u* *ɨ* ə 'dark'(yin 陰) vowels; *i* is considered 'neutral' and *i* is also considered 'partially neutral' after the sixteenth century by K.-M. Lee (1968).

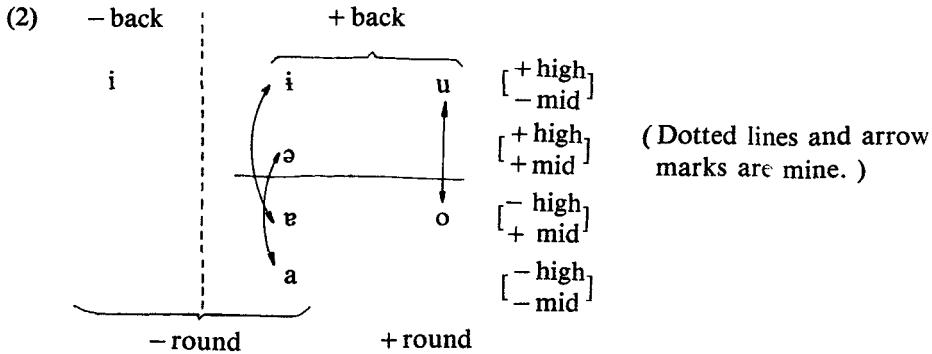
Three systems have been proposed: firstly, in Jakobson's terms, (A) horizontal harmony (high/low alternations) and (B) vertical harmony (front/back alternations), plus a third type as defined by Kiparsky(1973), (C) diagonal harmony. These three types will be used as criterion for the classification of VH.

A. 'Horizontal' hypotheses, type-I

S.-N. Lee was the first scholar to put forward the seven vowel system of LMK based on the description in *Hunminjōngŭm* (訓民正音). However, he misinterprets the phonetic description of the vowel ㅓ, in particular. Y.-S. Kim (1976) criticizes the fact that S.-N. Lee(1948: 22) regards ㅓ as 'tongue retracted' (舌縮), although it is described as 'tongue somewhat retracted'(舌小縮) in *Hunminjōngŭm*. This mistake caused him to equate the LMK vowel system and the Present-day Korean (henceforth, PDK) vowel system especially in the positions of back vowels. This misleading equation between LMK and PDK was stopped only after W.-J. Kim(1963).

Taking as a model S.-N. Lee's system, Y.-S. Moon(1974: 14-15) arrived at the following seven vowel system with four tongue heights for the underlying representation of LMK. In his distinctive analysis, he adopts the vowel feature 'mid' à la Wang (1968).

Although this system is able to specify the VH process with a single distinctive feature (+ high vs. - high), not only does evidence from a LMK text such as *Hunminjōngŭm* not completely agree with the position of S.-N. Lee and Y.-S. Moon, but also the heavy concentration of four vowels in the central column looks awkward. Most scholars place ɐ(=ʌ) below *o*, as a low back (rounded) vowel rather than as the mid central unrounded vowel that Moon conveniently posits. (C.-W. Kim 1978: 29)



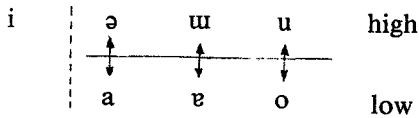
In addition, as Hyman(1975: 56) says, the introduction of the feature $[\pm \text{mid}]$ raises the question of whether a third feature may occasionally be needed to distinguish a fifth vowel height, if any. It is implausible that one may increase the number of features in proportion to the number of vowel heights.

B. 'Horizontal' hypotheses, type-II

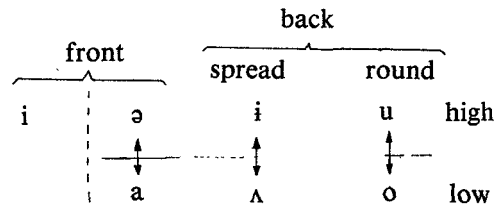
Starting with K.-M. Lee(1961: 115), U. Hǒ(1965: 375) and B.-G. Lee(1973: 29) give basically the same charts. S. Hattori(1974) also joins this group.

(3) K.-M. Lee (1961)

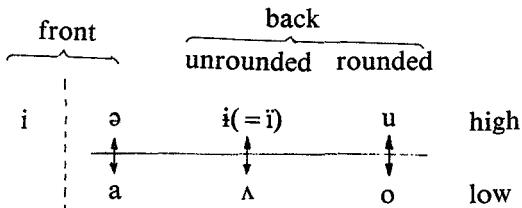
(no specification to backness)



(4) U. Hǒ (1965)



(5) B.-G. Lee (1973)

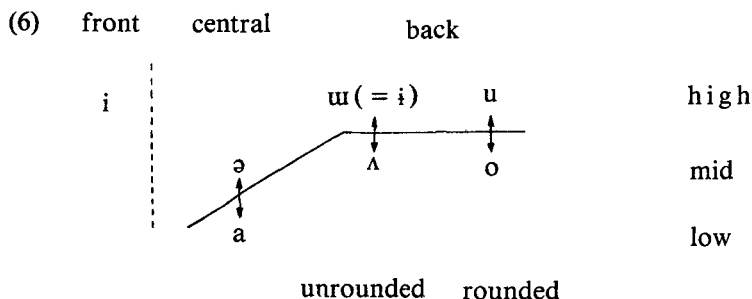


(Hǒ did not specify the exact position of vowel *i* but it is supposed by the writer that its position is front and high.)

U. Hǒ and B.-G. Lee are different only in terms of feature specification. In fact, U. Hǒ does not use terms like *SPE* features. As Kim-Renaud (1976: 406) commented, these reconstructions are not supportable in the light of textual evidence. For example, in the transcription of Mongolian loanwords in the fifteenth and sixteenth centuries the letter *o* represented either [o] or [u], and letter *ə* represented [e] (K.-

M. Lee 1972a). There is no reason to believe that the vowel height of *o* was low and became higher, while that of *ə* was high and became lower historically. In fact, the change seems to have been exactly the opposite (W.-J. Kim 1963). In addition, both K.-M. Lee (1968) and B.-G. Lee (1983) changed their hypotheses later.

K.-Ö. Kim (1975) slightly modifies this system to clear up the difficulties mentioned above.



The terminology [mid] is not acceptable as mentioned above and, in fact, relative vowel height with [+mid] can be simply replaced with $\begin{bmatrix} - \text{high} \\ - \text{low} \end{bmatrix}$.

Kim-Renaud (1976:407) also claims that relative vowel height alone cannot be the determining factor in the alternation of 'affixal VH.' Additional evidence against all vowel height hypotheses concerns the vowel *i*, which was neutral in LMK. It has often been claimed that the neutrality of *i* was due to its dual origin, nonback **i* and back **i* (Ramstedt 1957). If this is correct, there is no doubt that the early VH was a 'vertical' one as shown in the next section.

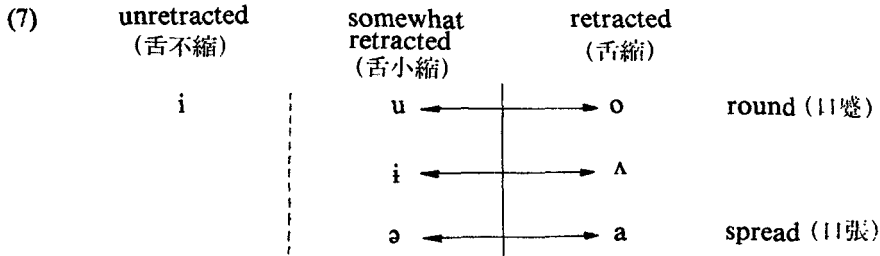
It is possible that previous to the merger of **i* and **i* there existed a back vs. non-back VH (see (21)). When the *i* and *i* merged, speakers would have had to memorize which *i* is harmonized with the back vowels and which with the front vowels. It might be assumed that such a heavy demand on memorization (or lexical diacritical marking) would be costly to the grammar and therefore might be expected to be eliminated. If these assumptions are correct, then the original system must have been a vertical one (back vs. non-back).

In fact, most of the Altaic languages to which Korean seems to belong have vertical (palatal) harmony systems. So it is likely that the vertical system as in the next section is a more agreeable hypothesis to LMK than the horizontal system in the previous description.

K.-Ö. Kim's system partly shows a 'diagonal' system which will be explained later.

C. 'Vertical' hypotheses

W.-J. Kim (1963) postulates the following vowel system of LMK, after scrutinizing the phonetic description on basic vowels in *Hunminjeongeum*.



He also gives the corresponding phonetic values as in (8).

(8)

[i]	[u]	[u]
	[ə]	[Λ]
	[ɜ]	[a]

S.-B. Cheun (1975) adopts this version without changes.

As Hayata (1975: 106) says, however, this interpretation does not seem to have received general support for its assumed phonetic values which do not relate realistically to those of LMK in view of considerable textual evidence, although the harmonic pairs are neatly distributed. Note that (7) will eventually match K.-M. Lee's VH system in LMK.

It was W.-J. Kim (1963) who first recognized the existence of vowel shift in Korean after the pioneering work by Ramstedt (1928) had already suggested the possibility of vowel shift in early Korean, although the date of vowel shift in Kim's hypothesis is as late as the middle of the eighteenth century.

Chǒng (1980) raised the following questions based on the reinterpretation of the description in *Hunminjǒngŭm*.

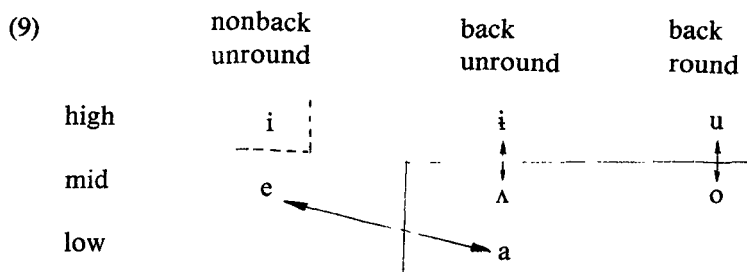
Is it right to interpret retracted (縮) as the tongue position and spread/round (張/蹙) as the aperture, i.e. mouth-opening?

Are ㅏ, ㅓ and ㅣ vowels the same in the aperture? If ㅏ and ㅓ are the same in the aperture, ㅣ should also be considered the same. However, in W.-J. Kim's system ㅣ is located at the round (蹙) level. Should ㅣ be lowered to the level paralleled to ㅏ and ㅓ?

It was apparent that Chǒng (1980) did not know that W.-J. Kim (1978) had already presented part of an answer to the above questions. This new system will be introduced in the next section entitled 'diagonal' hypothesis.

D. 'Diagonal' hypotheses

T. Hayata (1975) proposes the following harmonic alternations in LMK, avoiding a heavy concentration of vowels in the back position.

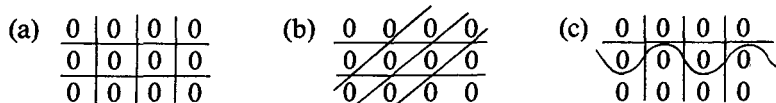


So-called 'light' vowels (a, Λ, o) are $[-\text{high}, +\text{back}]$, and 'dark' vowels (e, i, u) are $[\alpha\text{high}, \alpha\text{back}]$, whereas neutral vowel *i* is $[+\text{high}, -\text{back}]$.

However, this assignment of features does not match with the explanation of each sound in *Hunminjōngŭm* in which some concept equivalent to the modern 'distinctive features' is used.

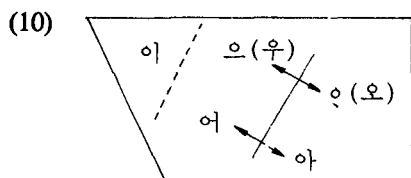
Although his idea is quite creative, I do not agree with him for the same reason as C.-W. Kim (1978) when he states: "There is no such thing as a 'diagonal' VH. It is not a system; it is a transitional phenomenon: a deformation and a historical vestige of an ideal VH system."

Moreover, a diagonal VH is not acceptable since any distinctive feature in generative phonology should represent either a vertically or horizontally 'straight' strip, but not a 'slant' or 'wavy' strip in the vowel square. Thus, only (a) is acceptable in the following:



One sole point of interest in this vowel system is that it coincides with K.-M. Lee (1969: 140)'s version of the vowel system for the twelfth or thirteenth century and (32) which is a brand-new system. I do not assume that these three systems have significant relations but it is worthwhile to note at least accidental correspondence among these systems.

Interestingly, W.-J. Kim (1978) withdraws his former claim (1963) on the vowel system based on the interpretation of 'retracted' (縮) in *Hunminjōngŭm* as the front/back feature. In other words, he reinterprets 'retracted' as a hypothetical feature which divides the space of the vowel square as follows.

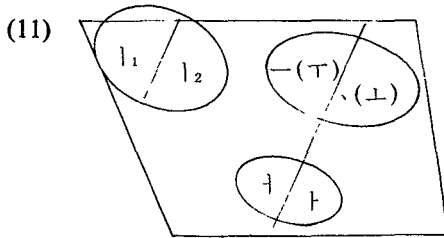


('Retracted' (縮) represents the lower right corner and 'unretracted' (不縮) the upper left corner.)

A dotted line and a wavy line run diagonally. Consequently, 어 vs. 아 and 으 (우) vs. ㅓ (오) show the diagonal VH.

An advantage in this new hypothesis based on the reinterpretation of 縮 is the complete correspondence of the VH system to the vowel system. W.-J. Kim also claims that this hypothesis is based on a more faithful interpretation of the phonetic description of basic vowels in *Hunminjeongeum*.

C.-H. Park (1983) suggests an interesting hypothesis on the six vowel system of LMK as follows.

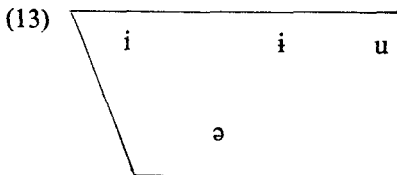


(12)

vowel	l_1	l_2	ㅓ	ㅓ	ㅓ	ㅓ
high	+	+	+	+	-	-
back	-	-	+	+		
ATR	+	-	+	-	+	-

This system is quite similar to that of W.-J. Kim (1978) except for the two underlying | vowels, i.e. l_1 and l_2 , and the introduction of the terminology [\pm ATR] (i.e. Advanced Tongue Root) instead of 'retracted' (縮). [\pm ATR], in fact, constitutes two natural classes: [$+$ ATR] including l_1 , ㅓ (ㅓ), ㅓ (ㅑ) = dark vowels, and [$-$ ATR] including l_2 , ㅓ (ㅏ), ㅓ (ㅓ) = light vowels.

Whereas C.-H. Park's argument concerning the establishing of the two underlying | vowels is less convincing and has not persuaded other scholars, B.-G. Lee (1983) also claims the similar hypothesis in line with W.-J. Kim's 縮 and C.-H. Park's 'ATR' as follows.



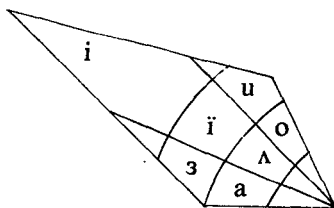
(14)

	i	u_1	u_2	i_1	i_2	∂_1	∂_2
high	+	+	+	+	+	-	-
back	-	+	+	+	+	+	+
round	-	+	+	-	-	-	-
ATR	+	-	+	-	+	+	-

It is likely that he assumes four vowels before the VH feature (i.e. ATR) is assigned to u , i , ∂ as in (13) and after its assignment he assumes seven vowels as shown in matrix (14).

C.-K. Kim (1984) presents an interesting diagram of seven simple vowels in LMK as in (15). This vowel square divided by concentric curves in the polar coordinate is nothing but a variation of W.-J. Kim's new system, and this should also be rejected by the same reasoning as applied to that of W.-J. Kim (1978).

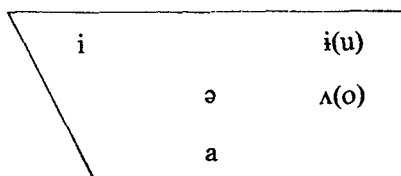
(15)



EXCURSUS

Note that W.-J. Kim's new system (1978) coincides with K.-Ö. Kim's system in the sense that *ə* and *i(u)* are moved to the right, up to the position where harmonic pairs *ə* and *a*, *ĩ* and *Λ*, and *u* and *o* line up vertically.

(16)



This 'adjusted' system of W.-J. Kim and K.-Ö. Kim's system have an advantage when the relationship between the vowel system in the fifteenth century and vowel system in PDK (cf. (29)) have to be explained consistently. This advantage is that *the same way of explaining the fashion of VH* can be applied. That is to say, the VH in LMK and PDK is nothing but *the lowest vs. the second lowest vowel in each 'order (or position of tongue: central and back)'*: *ə* vs. *a*, *ĩ* vs. *Λ*, *u* vs. *o*.

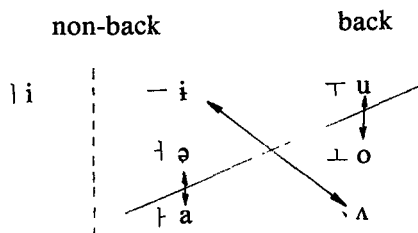
This idea can make avoidable an unnecessary lowering rule of *ö* and *o* and again a subsequent raising rule of *œ* and *ɔ* in PDK presented by McCarthy(1983). cf. (30).

However, such horizontal hypotheses are not intuitively acceptable, if one considers Korean as an Altaic language, because most of the Altaic languages have horizontal harmony.

E. 'Quasi-diagonal' but virtually 'vertical' hypothesis

K.-M. Lee (1968) assumes the following vowel system for the fifteenth century:

(17)



It looks as if his system is a typical 'diagonal' one as C.-W. Kim (1978) indicated. Indeed, this 'vowel system' (not VH system) alone will not be able to make vertical harmony. However, he claims that there is a discrepancy between the vowel system and the VH system during the same period. This enables us to establish the vertical VH system as (18) which is eventually identical to the vowel system of Early MK (10-14 c.).

(18) vowel system in Early MK = VH system in LMK

non-back		back
i	*u	*o
	*i	*Λ
	*ə	*a

Actually, two different systems (17) and (18) are used at the same time for the different dimensions and purposes: vowel system and VH in LMK.

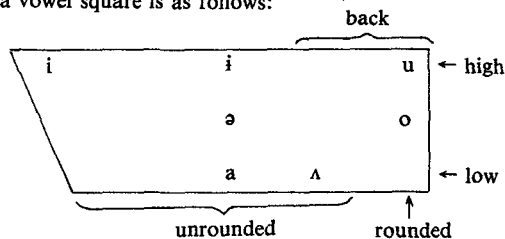
Since the phonetic values of each position on vowel charts are consistent while the actual positions of phonemes may be pushed or pulled on the chart depending on the directions of change, one may assume that phonetic values of vowel system (18) are as follows.

(19)

[i]	[i]	[u]
	[ə]	[o]
	[a]	[Λ]

Let us assume the feature matrices of these vowels as follows.¹ Note that (17) and (19) coincide with the first line of (20), and that this line is different from (18) and (21) which is compared at the bottom line in (20).

¹ To show (20) in the form of a vowel square is as follows:



In fact, the feature 'rounded' in (20) does not distinguish one phoneme from others. In other words, it is a redundant feature.

If Λ is regarded as one of the 'rounded' vowels, it may be more natural because all back vowels are [+rounded]. However, 'rounded' is still redundant because [+back] is identical to [+rounded] in this case.

It is also imaginable to assign [+rounded] to *i* in order to differentiate *i* from *ɨ*. Yet it is likely that *i* hardly had [+rounded] feature. Instead, [+front] feature for *i* will be suggested in (46) and (47) of chapter 5.

(20)		i	ĩ	ə	a	Λ	o	u
	high	+	+	-	-	-	-	+
	low	-	-	-	+	+	-	-
	back	-	-	-	-	+	+	+
	rounded	-	-	-	-	-	+	+
	cf.	i	*u	*ĩ	*ə	*a	*Λ	*o

Based on (18), one can reconstruct the following system of Pre-Old Korean assuming extinct *ĩ* as mentioned before. Note that there is not any neutral vowel yet in this system of four harmonic pairs.

(21)	non-back	back
	*i	*u
		*ĩ
		*o
		*Λ
		*a

The following excursus will compare K.-M. Lee's system (1968) to that of W.-J. Kim (1963). Let me put actual Korean letters in their positions on the vowel chart according to their claims.

(22) Lee's vowel system in 15 c.

ㅣ	i	ㅡ	ĩ	ㅜ	u
ㅓ	ə	ㅗ	o		
ㅕ	a	ㅛ	Λ		

(23) Kim's vowel system in 15 c.

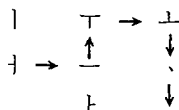
ㅣ	i	ㅜ	u	ㅗ	o
		ㅓ	ə	ㅛ	Λ
		ㅕ	a	ㅛ	Λ

Although it looks like a mere difference in assigning sound values to the same system, there lies a fundamental discrepancy between two systems as we are able to recognize by comparing the different positions of Korean vowel letters with their phonetic values given in (22) and (23).

That is, Lee presupposes a vowel shift in the fourteenth century, while Kim sets its date far later in the middle of the eighteenth century.

In other words, (22) is the result of a vowel shift from the system (24) of the earlier (pre-fourteenth) centuries² and (23) is the input for (25) which will experience a vowel shift and disappearance of Λ in the eighteenth century.

² In fact, Lee (1972: 114) presented another vowel system for the thirteenth century in order to assign a more realistic phonetic value to ㅓ :



With this system, he assumes so-called 'push-chain' in the direction of arrows starting from ㅓ and excluding ㅕ, as an alternative view to a 'clock-wise' vowel shift of (26).

(24) Lee's vowel system in 13 c. (25) Kim's vowel system in late 18 c.

() i	(ㄷ) ü	(ㅓ) u	i	— i	ㅈ u
(—) ə	(ㆍ) ɔ			ㅅ ə	ㅊ o
(ㅏ) e	(ㅑ) a			ㅓ a	

Both of them assume a vowel shift of clock-wise direction.

(26)



As a result of it, (22) resembles (25), and (23) looks the same as (24).

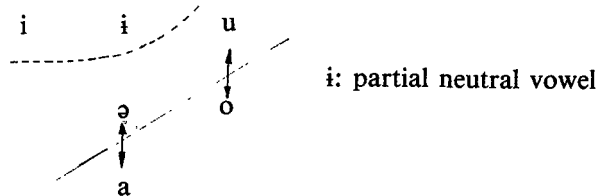
It seems to me that Lee's hypothesis is more acceptable on the basis of much historical evidence which will be enumerated in pp. 432-3.

Chǒng (1980) notes that there are some major differences between W.-J. Kim's hypothesis (1963) and K.-M. Lee's hypothesis (1972). Among them, the following is the most significant. That is, while Kim attributed the original cause of the vowel shift to "the raising of vowel — to the position of closed vowel i," Lee attributed it to "the backing (or raising) of vowel ㅏ to the position of mid vowel ə." Chǒng also notes that both Kim and Lee postulate the push-chain causing the loss of ㆍ in two steps (firstly, in the non-initial syllable and, secondly, in the initial syllable) without explaining the reasons why there are two steps in particular and why they start from the non-initial syllable.

Chǒng (1980) tries hard to explain these reasons in relation to the disappearing process of the tonal system.

C.-W. Kim (1978) agrees with K.-M. Lee (1968) and provides many other interesting remarks. cf. §2. Above all, he discusses spurious 'diagonal' harmony in Modern Korean as in the vowel chart (27), and concludes that this diagonal harmony is a transitional phenomenon from a full VH system to a reduced one.

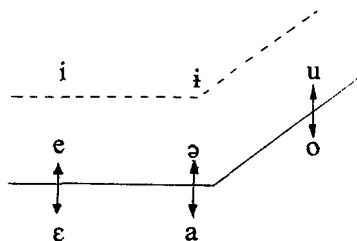
(27) 18 c. (6 vowels)



Since the sixteenth century, merger of ㅓ into *i* in the non-initial syllable causes a partial neutralization of *i* (Ogura 1929, K.-M. Lee 1972a). Synchronically, however, *i* is dark in initial syllables (because it is historically from the non-back mid "dark" vowel ㅓ). cf. Kim-Renaud (1976: 403).

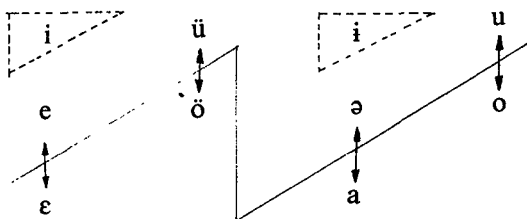
In fact, (25) shows the vowel system in the latter half of the eighteenth century. By this time, Λ is lost comparing to the fifteenth century system of (17). In the eighteenth century, a merger of Λ into a in the initial syllable did not cause a neutralization since it is a merger between the same group of V's, but caused a complete disappearance of Λ in Korean. However, a gets another opposition with ə , while it keeps the old opposition with ə . For a at this stage may be either from Λ or a depending on its history. Then, in the nineteenth century, we encounter two more front vowels e and ϵ caused by the monophthongization ($\text{əy} \rightarrow e$, $\text{ay} \rightarrow \epsilon$). That this change happened soon after the loss of Λ is shown by the fact that Λy also became ϵ (K.-M. Lee 1972a: 122). For this reason, the light vowel ϵ has two dark counterparts i and e , just as a has two dark counterparts i and ə (Kim-Renaud 1976: 403).

(28) 19 c. (8 vowels)



Since the twentieth century, we have had the most flourishing vowel system with additional two front round vowels, ö and ü through the monophthongization ($\text{oy} \rightarrow \text{ö}$, $\text{uy} \rightarrow \text{ü}$).

(29) 20 c. (10 vowels)³

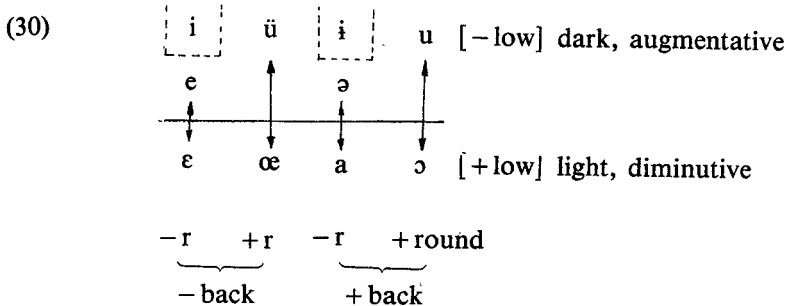


³ Some scholars have presented different views on the Korean vowel system of the twentieth century. For instance, C.-W. Kim (1968) assumed only four underlying vowels such as i , ə , a and o , while I.-H. Lee (1978) assumed eight simple vowels (i , e , æ , i , ə , a , u and o) as in the nineteenth century.

As Kim-Renaud (1976) points out, *i* and *ɨ* are 'dark' vowels (cf. § 4) in initial syllables while they are neutral vowels in non-initial syllables.

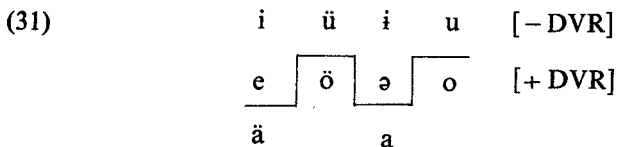
However, (29) shows doubly diagonal system whereas (9), (10), (11), (27), and (28) show singly diagonal system. Among the latter system, (27) may be interpreted as 'quasi-diagonal' but virtually 'vertical' system just like (10). Likewise, (28) can be interpreted as 'quasi-diagonal' but not easily as 'vertical' system because it is implausible to assume an underlyingly vertical system including *e* and *ɛ*, which had developed after the vowel shift.

As for (29) which is doubly diagonal, it is also implausible to assume any type of underlyingly vertical system with *e*, *ɛ*, *ü* and *ö* which has been acquired later. On the contrary, one may assume a 'horizontal' harmony system as McCarthy (1983) and Hayes (in personal communication⁴) already suggested. In their system of positing more [+low] vowels, *ö* and *o* are changed in *æ* and *ɔ*, respectively.



A context-free rule, applied subsequent to harmony, then take all [+round] vowels to [-low]. Synchronically, this analysis looks like working. Diachronically, however, this 'horizontal' harmony system is the unique case through the history of the Korean language, since we did not buy any 'horizontal' theory in the previous sections.

One may also complain about assigning the feature [+low] to *æ* and *ɔ*, and suggest other feature which can cover *ɛ*, *æ*, *a* and *ɔ* more naturally. In fact, Y.-S. Kim (1984) suggests the feature [+Deep Voice Resonance] with high sonority.

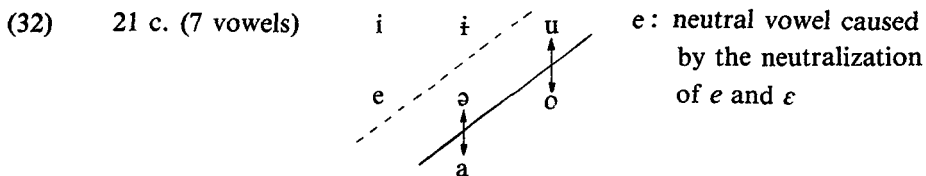



⁴ Bruce Hayes suggested to me that relatively 'low' feature is empirically necessary to analyze PDK. He arrived at this conclusion during the 1983 UCLA Summer Linguistic Institute of LSA without knowing that McCarthy (1983) had already presented the same idea in CLS '83.

As already clarified, any distinctive feature in generative phonology should represent either a vertically or horizontally 'straight' strip, but not a 'wavy' strip as above.

Moreover, Y.-S. Kim has to justify the necessity of establishing a new distinctive feature like $[\pm \text{DVR}]$ on the universal viewpoints. In other words, should this feature be motivated in order to explain other languages in the world, too?

As C.-W. Kim (1978) observes, there arises a new vowel system which is just in progress at this moment in some speakers especially of the younger generation.



This system will probably be the general Korean vowel system in the twenty-first century. Note that the shape of this system  is interestingly similar to K.-M. Lee's second system in footnote 2 and also to Hayata's system.

In conclusion, K.-Ö. Kim's system is better than U.Hö's in the sense that the former is more faithful to the phonetic value of each vowel, i.e. the location of vowel phonemes in the vowel chart is more realistic because it matches the place of articulation of vowels. It has, however, as in the cases of Hayata and C.-W. Kim, the difficulty of insisting a diagonal system.

K.-M. Lee has investigated the data of Korean letters written for ḥP'ags-pa letters, Chinese characters, Japanese kana and also Mongolian loan words in order to establish the actual sound value of Korean vowels at different stages in history. He has convincingly proved that all this data supports his hypothesis claiming a vowel shift in the fourteenth century.

Whereas W.-J Kim's strongly held point is a faithful interpretation of *Hunminjōngŭm*, he has not overtly objected to the hypothesis based on the above-mentioned data.

K.-M. Lee could explain both the VH system and the vowel system successfully by making the best use of the idea of a possible discrepancy between the two systems. In particular, he made the front-back opposition possible in the VH system of the fifteenth century and implied that this vertical harmony had been inherited from the Proto-Altaic language.

Yet his view entails two major problems: firstly, one has to admit that the system of VH from the fifteenth century to date has been the same and that this system is nothing but the vowel system prior to the fourteenth century. Is this view followable, especially in a synchronic viewpoint for the study of PDK? Secondly, he interpreted the record of phonetic description in *Hunminjōngŭm* not as a description of the vowel system but as a description of the VH system. Is this interpretation plausible considering that King *Sejong* and his court scholars seem to have been precise in describing sound values as they were?

W.-J. Kim's revised system introduced in 'Excursus,' C.-H. Park's system, B.-G. Lee's system, and Y.-S. Kim's system are all unacceptable because they assume a diagonal system which is not compatible with the present framework of generative phonology in which only non-slant and non-wavy lines are permitted in zoning the distinctive features, no matter whether they are 'retracted' (縮), ATR, or DVR.

As for McCarthy's system, it is likely that he achieved the straight zoning of the feature system by lowering *ö* and *o* into *œ* and *ɔ* (i.e. [+low]), respectively. Yet this lowering and afterward raising rules are against our intuition. It might be better if one could solve the problem in the Korean vowel system without changing the position of phonemes by lowering or raising.

2. Typological Idiosyncrasy of Vowel Harmony in Middle Korean

According to the typological classification of VH by Aoki (1968), VH in LMK belongs to palatal, symmetric harmony with front vs. back alternating forms like many other Altaic languages.

An outline of VH in LMK was comprehended as in (1) by S.-N. Lee (1947). There were two series of vowels, traditionally called 'light' and 'dark', respectively, plus a neutral vowel *i*.

Note once more that a scheme like (1) is the vowel system and also VH system in Early MK, but it is merely the VH system in LMK. The vowel system in LMK is (17). Therefore, whenever we regard (1) as the VH system in LMK, recall that underlying these vowels are the reconstructed sounds found in (18) or (21) such as **u*, **o*, etc.

With the help of modern terminology, we can describe this outline more precisely. That is to say, inside of morphemes of LMK, as a morpheme structure condition, dark and light vowels cannot co-occur. As a phonological rule, suffixes which are not beginning with an underlying consonant including glides or with a neutral vowel choose the homogeneous of two alternating forms, depending on the last non-neutral vowel of the preceding stems.

As mentioned before, (1) constitutes a natural class in the system like (18), i.e. VH system in LMK coincides with the vowel system of Early MK rather than that of LMK. Nevertheless, it does not constitute a contradiction, for a vowel shift occurs in the fourteenth century.

Textual evidence for this sort of vowel shift includes the following kind (C.-W. Kim 1978: 36).

“(a) The original vowel *u* in early Chinese loan-characters is transcribed as *o* in post-fifteenth century. Korean texts, indicating that there was an *u* → *o* change sometime before the fifteenth century (K.-M. Lee 1972a: 107).

(b) Mongolian loan-words that came into Korean during the thirteenth century, but were written down in Korean script in the fifteenth century show the following correspondences (K.-M. Lee 1972a: 112).

Mong. (13 c) a o u e ö ü i

Kor. (15 c) a o o ə wə u i

(c) The twelfth century Chinese texts transcribe the now extinct Korean vowel with the characters whose vowels were either *o* or *a*, indicating that this extinct vowel may have had the range of *o~a* if not outright *ɔ*, in the twelfth century (K.-M. Lee 1972a: 113)."

It is not unreasonable to imagine that VH was once based upon the old vowel system (prior to the thirteenth century) and remains as it was even after experiencing the vowel shift. Since VH is a morphophonemic phenomenon, it is a rather conservative part of the grammar not affected by the change of vowel system (K.-M. Lee 1968: 380).

To illustrate the above discrepancy between two systems more convincingly, K.-M. Lee (1968: 380f) quotes two more cases from the Mongolian and Tungus languages. In the Mongolian languages, **ay* and **oy* changed into the front vowels *ä* and *ö*, respectively. In Kalmuck vowel harmony, *ä* and *ö* take the suffix with front vowels as expected. In Buriat, however, *ä* and *ö* (as developments originally from back vowels) still take the suffix with back vowels, since people tend to recognize the old system for VH (Poppe 1965: 184).

Evenki, one of the Northern Tungus languages, has roughly the following system of VH: *a ä o ö ē* vs. *ę ĕ* plus neutral vowels *i ī u ū*. It is likely that this language originally knows palatal harmony according to the comparative study of the Tungus languages. However, a front vowel *ē* is grouped together with back vowels, because it is a descendant from **ya*.⁵

Although one who rejects K.-M. Lee's claim should submit reasonable counterevidence to the Altaic cases mentioned above, no such evidence has been presented.

But from the synchronic point of view (Y.-K. Kim-Renaud 1976: 405), "it is hard to imagine that the underlying phonological structure has such an extreme dissimilarity to the surface forms and that a person learning a language is able to reconstruct complicated vowel shifts that happened during several centuries on the basis of purely synchronic information." This is a vulnerable point in Lee's claim, as already mentioned at the end of chapter 1.

However, there are more indications that are suggestive of some sort of historical vowel shift in Korean (C.-W. Kim 1978: 33-4).

"(a) Pairs of vowels that participate in VH assume neither the same height nor the same front/back dimension. Thus, compared to Turkish whose vowels are paired *i/ī*, *ö/o*, *ü/u*, and *ä/a*, the pairing in Korean, *o/u*, *a/ə*, is highly irregular and may be the result of a historical vowel deformation.

(b) The counterpart of *i* and *ī* are missing in modern Korean. The loss may have been due to the merger with their "spouses," which may have contributed to the vowel deformation.

(c) All the other languages in the Altaic family to which Korean is supposed to belong possess fairly

⁵ It is likely that Korean had already experienced the same stages as Evenki and Mongolian, in this order. In the fifteenth century, this regularity already began to be perturbed yielding the very arbitrary forms like a neutral stem vowel followed by either a light or a dark suffix vowel.

There were many irregularly perturbed forms without neutral stem vowels like *saram* + *in* (cf. *saram* + *an* also appears at the same time). Likewise, forms with a neutral vowel followed by either a light or a dark vowel are nothing but perturbed ones.

regular palatal (vertical) VH. The present system in Korean could be the result of a "decay" of an earlier harmonically ideal system.

(d) VH in Korean is in the process of disruption. The vowel deformation must be directly responsible for the disruptive process of VH (since the 15th century when it was more regular and systematic)."

If we recognize the above unique problems in Korean VH, its implications for historical phonology are the following ((a) & (b): K.-M. Lee 1968, 1971; (c), (d), (e), & (f): C.-W. Kim 1978):

(a) It should be argued that the usual agreement between the vowel system and the system of VH can be broken by a change of vowel system. If this change is partial, then a readjustment may follow easily, but if it is an overall change caused by a vowel shift, then such a readjustment is much more difficult and less likely to occur.

(b) We may claim an interesting theory that the VH, when it does not coincide with the vowel system at that time, possibly shows a way to reconstruct the earlier vowel system.

(c) There is no such thing as a 'diagonal' VH. It is not a system but a transitional phenomenon; a deformation and a historical vestige of an ideal VH system. [sic]

(d) When we find a diagonal VH, we can predict that an earlier vowel system had a regular VH, and also predict that VH will eventually disappear from the diagonal vowel system. [sic]

(e) It can be said that if a language has a diagonal VH while other genetically related languages display regular VH, then the language with a diagonal VH must be the most innovated (with respect to the vowel system) of all languages in the group. [sic]

(f) In addition, in describing a "diagonal" VH in a synchronic group, a sort of adjustment rule (e.g. C.-W. Kim 1973) is needed to restore the earlier system.

Note that (b) is eventually on the lines of (d) and (e), and that the concepts of 'adjustment' in (a) and (f) are different.

3. Vowel Harmony and Disharmony in Middle Korean

Before I proceed to survey the outline of MK VH in line with the recent theories on VH; we had better note the following points for further references, when 'disharmony' will be discussed.

Some of the major factors contributing to the disturbance of this (VH) pattern were: (1) a vowel shift, which changed the back/nonback distinction; (2) monophthongization which also made the back/nonback distinction indecisive; (3) unification of allomorphs into one form in various affixes; (4) a massive borrowing from Chinese, which knows no VH" (Kim-Renaud 1976: 397).

When the VH is within a morpheme, it is not clear whether one should speak of one vowel assimilating to the other or of a suprasegmental assignment of the shared vowel feature. Thus, Korean, like the Finnish example [pöytä] 'table' and [pouta] 'fine weather,' has the two words [nəmu]⁶ 'too much' and [namo] 'tree.'

⁶ There was also a form [nəmo] which violates the vowel harmony rule. However, such examples of violation are not rare even in earlier literature since they were in the stage of perturbation.

These words differ in that all of the vowels in 'too much' are [– back], while all of the vowels in 'tree' are [+ back]. Within the mono-linear framework of earlier generative phonology, there have been three approaches to the underlying representation of VH (Kiparsky 1968, Vago 1973).

In the first approach, an underlying abstract feature (root-marker) such as [\pm GRAVE] is assigned to each morpheme (Lightner 1965). In this case, the two Korean words would be represented, respectively, as /nAmO/ [– GRAVE] and /nAmO/ [+ GRAVE], where capital letters represent archiphonemes.

In the second approach, one vowel (the first or last) is fully specified, while all other vowels in the same morpheme are represented by means of archiphonemes, that is, partially specified segments in the underlying form (Zimmer 1967, Bach 1968, Carrell 1970). In this case the two Korean words would be represented as /nəmO/ and /namO/, respectively. The archiphoneme /O/ is converted to [u] after a front vowel, [o] after a back vowel.

In the final approach, as argued by Kiparsky (1968), as opposed to both of the above proposals, all vowels within morphemes are fully specified (Stanley 1967) and the fact that all vowels agree in backness within a morpheme is captured by means of a morpheme structure condition. Two Korean words, in this approach, would be represented as /nəmu/ and /namo/.

Of the three approaches, only the first approach (morphological solution, or phonological use of diacritic features) treats VH as a suprasegmental property inherent to root-morpheme. In the second approach (abstract solution, or diacritic use of phonological features), VH is seen to be the property of, in this case, the first vowel of each morpheme, while in the third (rule feature solution), it is seen to be a redundant property of morphemes. In all approaches, a rule of VH assimilate vowels across morphological boundaries, which I will show later in the case between a stem and a suffix.

Kiparsky (1968: 28-31), in particular, reconsidered the whole problem of VH in the light of the theory of markedness, and ended up with the asymmetry in Finnish between stem and suffix vowels: 8 stem V's vs. 5 suffix V's. According to the theory of markedness, only the affix vowel is harmonized by phonological rule; the stem vowels are specified in the lexicon, and morpheme structure condition (MSC) allows only the form containing harmonically compatible vowels.

He also pointed out that it is impossible to derive both root harmony and affix harmony by a single rule, because they have different sets of exceptions and are therefore different processes. Finnish contains a large number of loanwords which contain harmonically incompatible vowels. Obviously, these words are exceptions to the stem harmony MSC. The same is true in Korean, since there are a large number of SK words which violate MSC: e.g. *yənko* 'cause' (SK. 緣故), *manmin* 'all the people' (SK. 萬民), etc. This kind of examples in Korean are not studied much except some comments by Hayata (1975).

"Compound words, where each element is a morpheme, and Sino-Korean words, where each Chinese character can be a morpheme, can contain dark and light vowels together, e.g., *cuk* + *sari* 'death and life,' *rok* + *du* 'green bean'."

On the contrary, native pure Korean words mostly⁷ fit in MSC: e.g. *narah* 'nation,' *mazam* 'mind,' etc.

Kiparsky (1968: 31) adds more on the affix VH of loanwords in Finnish as follows. "Yet they [loanwords] all strictly observe the VH rule, their affixes undergo exactly the same rule as do those of native words: vowels are fronted if the last non-neutral stem vowel is a front vowel." It is also true in Korean: e.g. *yənko* + *rar*, *manmin* + *ai*. He continues, "Affix harmony, then, is a totally regular process, whereas root harmony is to some extent irregular and does not apply in the relatively unassimilated strata of the borrowed vocabulary."

However, Vago (1973) presents a wide variety of evidence showing the exceptional character of affix harmony in many Uralic and Altaic languages. Furthermore, he shows that a rule exception feature analysis is inadequate to characterize these cases, since both types of exceptionality exist in the same languages: front vowel stems which take back vowel suffixes and back vowel stems which take the front version of the same suffixes. Thus, it is impossible to account for these cases by assuming *one form* of the suffix as basic and treating stems that occur with the wrong harmonic form of the suffix as being exceptional. So Vago concludes that the evidence from exceptionality falsifies a theory of VH that is based upon rule exception features, and that a more abstract analysis involving absolute neutralization is required.

However, Vago agrees with Kiparsky as far as in accounting for stem harmony by MSC's and affix harmony by a phonological rule, in other words, the separate treatment of root and affix harmony. Vago also assumes fully specified underlying representations advocated by Kiparsky (à la Stanley 1967).

To relate Vago's VH theory to the MK data, let us take a look at the case between a stem and a suffix (or suffixes). In principle, only the first vowel of the suffix harmonizes with the last non-neutral vowel of the preceding stem across a boundary.

Some typical examples shown in Cheun (1975) are as follows. (L = 'light' vowel, D = 'dark' vowel).

- (33) a. L (Stem V.) + L (Suffix V.)
 mazam + *ar* 'mind' (acc.)
 yənko + *rar* 'reason' (SK. 緣故)
 b. D + D
 pir + *ir* 'fine'
 kə + *rir* 'vehicle' (SK. 車)

When a stem vowel is a diphthong ending with the neutral /i/, then the suffix vowel harmonizes with the last non-neutral vowel (N = neutral vowel).

⁷ I say 'mostly,' because the available data from fifteenth century literature already shows many perturbed examples even in the VH of pure Korean words: e.g. *čyāčyā* 'market,' *mončyā* 'first of all.' More examples in W.-J. Kim (1971).

- (34) a. L.N + L
 ch Λ ik + Λ r 'book' (SK. 冊)
 nor \ddot{a} i + r Λ r 'song'
 b. D.N + D
 cy \ddot{a} i + rir 'brother' (SK. 弟)

When the suffix consists of more than one vowel, only the first suffix vowel harmonizes.

- (35) a. L + L
 son + Λ ro 'hand' (instrumental)
 b. D + D
 kim + iro 'money'

When a stem is followed by more than one affix, harmony is observed all through the string.

- (36) a. L + L + L
 ar + om + Λ r 'knowing' (nominalizer + acc.)
 b. D + D + D
 t \ddot{a} r + um + ir 'deducting'

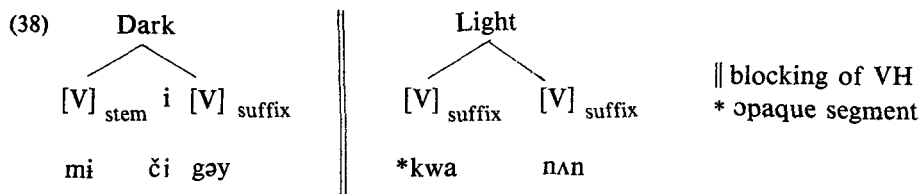
One may not find a specific reason why the separate treatment of root and affix is needed in LMK based on the data presented so far. However, it is still needed in LMK for an entirely different reason from the Finnish case. That is, the VH in a certain suffix is blocked especially when the suffix is started by a consonant, a so-called 'opaque' segment. The sample list of those suffixes is as follows. (cf. W.-J. Kim 1971)

(37) non-harmonizing suffixes

- | | |
|--|---|
| a. plural marker -t Λ h | b. commitative -kwa/-wa |
| c. vocative -ha/-a | d. inclusive -to |
| e. emphatic -za | f. present -n Λ - |
| g. past imperfect -t \ddot{a} - | h. subjunctive -k \ddot{a} -/- \ddot{a} - |
| i. volitive present -no- | j. honorific -s Λ β - |
| k. adjectivalizer -t Λ β -, -r Λ β - | l. statement -ta |
| m. question -ta, -ka | n. exclamation -tota |
| o. strong command -kora | p. optative -ko \ddot{y} \ddot{a} /- \ddot{h} o \ddot{y} \ddot{a} |
| q. honorific -s Λ ta | r. connective -ko/- \ddot{h} o |
| s. adverbial -k \ddot{a} y/- \ddot{h} \ddot{a} y, -kiy/- \ddot{h} iy | t. degree (suf. terminales) -t Λ rok |

In the case of these consonant initial suffixes, they need to specify fully suffix vowels of the underlying form in the lexicon. In other words, it has to be marked that these suffix vowels are not affected by VH.

Such disharmony may be illustrated with the following example.



Other cases of disharmony can be summarized in the following chart where || are used in the heading of columns out of | (thick) line.

(39)

stem \ suffix	∅	V _{suf}	V _{suf} + V _{suf}	V _{suf} V _{suf}	V _{suf} + V _{suf}
V _{st} (stem vowel)	s ^L on, m ^D ək	p ^D ir + i ^D r m ^D ək + ə ^D	ārph + āy + n ^L an	m ^D ək + i ^D + rō ^L	p ^D ir + kwā ^L + n ^L an
V _{st} + V _{st}	kā ^L rām, kūrū ^D m sās ^L ām, kəpū ^D p	nārā ^L h + ā ^D r		h ^L ā + kō ^L + čy ^D ə	
V _{st} + V _{st} + V _{st}	kāmā ^L gōy, mīčigēy	āčā ^L mi + rī ^D r	harmony ↗		
V _{st} V _{st}	kār + wēm ^D ē + tōr- tāt + pōm ^D ə ^D ək + m ^L ay ² sī + kālβār ^L tēs + mūzū ^D	čū ^D k + sār + i ^N ə + mā + nīm ^N pīt + tan ^L gi + ə ^D ā ^L ā + uh + i ^N (the same as left) + ə ^D (left) + tā ^L (left) + h ^L ā. tā ^L (left) + i ^N	disharmony ↘		
V _{st} V _{st} + V _{st}					
V _{st} + V _{st} V _{st} V _{st} V _{st} + V _{st} V _{st}	kəs + mārā ^L + čū ^D k				
V _{st} V _{st} V _{st} + V _{st}	mā ^L .ə.mā + h ^L ā ³				
V _{st} + V _{st} V _{st} V _{st}	pān.tār + wən.tār ⁴				
V _{st} V _{st} V _{st} V _{st}	nā.pyəy + nā.pyət ⁵				

Additional examples to the columns of V_{suf} (1) and ∅ (2~5):

1. V_{inflectional} suffix

pār^Lk + ā^Ln, pāt + ā^L

V_{derivational} suffix

sār + ā^Lm, māč + ō^L, nēm + ū^D

(39) cont'd

- | | |
|---------------------|--------------------|
| 2. ɔ̃p + kɔ̃y | 4. wa.sak + pə.sək |
| mir + wəŋ | way.kak + te.kək |
| pu + hwa | 5. kup.ɔy + kup.ɔy |
| myət + ma | pə.təŋ + pə.təŋ |
| hyən + ma | pu.sar + pu.sar |
| əs + ma | uk.or + uk.or |
| me + βas- | ur.thəŋ + pur.thəŋ |
| 3. tɔy.kir + te.kir | |

There are also some examples of disharmony in PDK. The most frequent pattern of disharmony is a 'a followed by *u*.' It seems that this non-initial *u* is a newly developed neutral vowel.⁸

- (40) namu, maru, čakuk, maŋur, aur-, pasu-, tathu-, kak'uro, k'aŋčuŋ, k'amučačap, k'apur, sap'un, kyaut'uŋ, kyaut, kyarruk/k'yaruk, k'arčuk/kyarč'uk, k'apčuk, k'aktuk(i), t'ark'uk(čir), tamp'uk, parruk/parruŋ, arktuk(peki)

The other examples than 'a followed by *u*' are as follows.

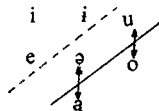
- (41) toŋmu, paü, k'akčəŋi, kəkur(i), k'əcək/kečuk, ərkpark(kosək), nap'i-, sosiračhi-, karkiraŋ, totirak, okir(aŋ), toŋkirah-, mantir-

As B.-G. Lee(1983) pointed out, there was the case of disharmony when a stem of either light or dark vowel takes a suffix of either light or dark vowel in LMK.

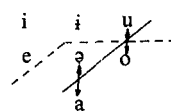
⁸ In PDK, *u* in an initial syllable has remained a dark vowel, but *u* in a non-initial syllable may be regarded as a partially neutral vowel, just like the case of *i*. Refer to the end of chapter 4, too.

However, this new treatment of *u* implies that we have to amend the vowel system of PDK (cf. (29)) and also that of the twenty-first century (cf. (32)). At first (32) will be rearranged as follows.

(32) In the initial syllable

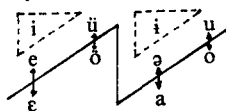


(32') In the non-initial syllable

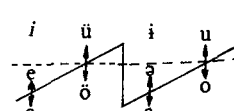


Although the number of examples is very limited, it is possible to find an example which implies that even *ü* in a non-initial syllable is a partially neutral vowel. For instance, *yəü-* tends to take not *yaö-* (which appears in the Ch'ungch'öng dialect) but *yau-* as its paired form. Thus, (29) may be rearranged as follows:

(29) In the initial syllable



(29') In the non-initial syllable



It seems to me that *u* and *ü* in (29') and (32') behave as a dark vowel or neutral vowel depending on an individual word in the lexicon.

- (42) nəyh + ʌn/in, muy + yom/yum, paɣ + a/ə, taoy + a/ə,
 hway + ʌy/iy, aɦʌy + ʌy/iy, poɦʌy + ʌy/iy, čəh + om/um,
 cimin + ʌr/ir

When a stem contains only neutral vowels or ends with a neutral vowel not in a diphthong, then either back or non-back endings can be attached.

- (43) a. N + L
 ri + rʌr 'village' (SK. 里)
 b. N + D
 azami + rir 'aunt'

Sometimes words with the neutral vowel co-occur freely with either back or non-back sets of suffixes as can be seen below, although they tend to behave as non-back stems.

- (44) a. N + L
 kirh + ʌr 'road' nič + ʌni 'forget, therefore'
 b. N + D
 kirh + əi 'road' (loc.) nič + ini 'forget, therefore'

More examples: kʌri + o/u, kiph + ʌy/iy, sip + a/ə, kithi + om/um;
 also cf. kiri-/kirʌ-, pinir/pinʌr.

Once considering (44), even (43) looks very spurious. There should be some elaborated elucidation on neutral vowel and its related problems.

4. On Neutral Vowels

In Hungarian, a number of stems with neutral vowels, *i í* (= long *i*) and less frequently with *e é*, systematically take back-vowel suffixes: e.g. *szid-unk* 'we curse,' *hív-unk* 'we call.'

As mentioned earlier, there were three main approaches to account for these stems: (1) the morphological solution (2) the abstract solution (3) the rule-feature solution (cf. Vago 1973: 581).

Cheun (1975: 14) notes that no alternative mentioned above is tenable with the LMK data. Recall that one and the same stem *kirh* or *nič*- does co-occur with both back and non-back suffixes. According to the abstract solution, we may posit /kirh/ and /nič/ for the cases of *kirh* + ʌr and *nič* + ʌi. Although these abstract base forms may produce the forms with back versions of the endings, these forms fail to produce the forms with non-back versions of the endings, *kirh* + ər or *nič* + ini.

We run into the same difficulty in the remaining two alternatives. The lexical representation $\left[\begin{smallmatrix} \text{kirh} \\ + \text{GRAVE} \end{smallmatrix} \right]$ will derive only *kirh* + ʌr and $\left[\begin{smallmatrix} \text{kirh} \\ - \text{VH} \end{smallmatrix} \right]$ will derive only *kirh* + ər when the underlying suffix is /-ʌr/ and *kirh* + ər if the suffix is /-ər/.

Synchronically one may say that, when a stem contains only neutral vowels or ends with a neutral vowel (not in a diphthong), it is free to choose either light or dark suffix vowels as in (43) and (44). However, this kind of unpredictable behavior of the neutral vowel in LMK is not found in other languages with VH and neutral vowels; it is very unusual.

As mentioned above, it must be assumed that both **i* and **i̥* existed before these two high vowels merged into *i*. Thus, *nič-* should have either **i* or **i̥* in the earlier period, although it is not attestable which vowel was used in that stem. However, after the merger of these two vowels, either *-ani* or *-ini* were attached to *nič-* just like the perturbed VH in *saram* + *an* or *saram* + *in*.

In short, the fact that *nič-* co-occurs with both back and non-back suffixes is nothing but the perturbation of VH. The irregularity of VH came to include the case of the neutral stem vowel as in *nič* + *ani/ini*, *kirh* + *ar/ər*, etc. and also expanded to the phenomena of stem vowel alternation between *kiri-* and *kirA-*, and between *pinir* and *pinar*.

In addition, since the sixteenth century *i* in a non-initial syllable has also behaved like a neutral vowel because of a merger with *A*, but *i* in an initial syllable has remained a dark vowel. Therefore, one can define this situation as 'partial neutralization' of *i*.

It seems that the similar situation occurs in the PDK in the case of the vowel *u*. In the examples in (40) where VH is broken, in most cases *a* is followed by *u* which cannot be regarded as a dark vowel any more, but as a 'neutral' vowel — partially neutral in a non-initial position. B.-G. Lee (1983) tries to formulate some rules for this disharmony, for example the rule as presented below:

(45) Disharmony

$$V \rightarrow [-ATR] \quad / \quad \left\{ \begin{array}{c} \sigma \\ \left[\begin{array}{l} - \text{cons} \\ - \text{back} \end{array} \right] \quad (V) \\ \left[\begin{array}{l} + D \\ + ATR \end{array} \right] \end{array} \right\} \quad C_0 \text{---}$$

5. Vowel Harmony Rules in Middle Korean

Since I reject the vowel-height hypothesis and the diagonal harmony in the previous chapters, the only remaining way to formulate the rule is to take as a basis the vertical harmony system suggested by K.-M. Lee (1968).

With the feature matrices of (20) in chapter 1, we can represent *i* as [+high] and [−round], but with these two features conjunctively, it is not easy to differentiate *i* from *i̥* and to single out the 'neutral' vowel *i* which behaves in a different way from all others in VH. So, à la Cheun (1975), I suggest another feature [±front] for *i*. Only *i* is [+front] and the other vowels are [−front].

As just a tentative formulation, (46) can be suggested based on the data so far presented.

$$(46) \quad \left[\begin{array}{c} V \\ -\text{front} \end{array} \right] \rightarrow [\alpha\text{back}] / \left[\begin{array}{c} V \\ \alpha\text{back} \\ -\text{front} \end{array} \right] Q + \text{---}$$

$Q \approx [+ \text{syll}]$ (about Q notation, cf. Halle 1975)

However, this rule is not enough, one part of the VH is optional, i.e. (46) applies optionally when the last 'non-included' (not as a part of a diphthong) vowel is neutral. Therefore, the revised version of the rule will be (47). cf. Cheun 1975.

$$(47) \quad \left[\begin{array}{c} V \\ -\text{front} \end{array} \right] \rightarrow [\alpha\text{back}] / \left[\begin{array}{c} V \\ \alpha\text{back} \\ \left\{ \begin{array}{l} [-\text{front}] \text{ (a)} \\ [+ \text{front}] \text{ (b)} \end{array} \right\} \end{array} \right] Q + \text{---}$$

$Q \approx [+ \text{syll}]$ Condition: (b) is optional.

To express the afore-mentioned phenomenon more illustratively, let us introduce the modern theory of multi-linear phonology. Following the autosegmental theory, a characteristic property of vowel harmony systems is the presence of vowels that in some way interrupt the smooth flow of the spreading feature. Basically these vowels seem to be of two types. (Hulst and Smith 1982a: 21)

"The first type of apparent interruption concerns vowels that are not affected by the harmony process at all. Such segments are called *neutral*. What is curious about neutral segments is that they are transparent for the spreading process.

The second type of interruption concerns segments that, like neutral segments, are not affected by a spreading feature, but that, unlike neutral segments, are not transparent. Such segments block the spreading and they are called *opaque*."

With the definitions given above, it can be concluded that VH is triggered by $[\pm \text{back}]$ and the sequence of non-neutral and non-opaque vowels undergo this VH, plausibly rightwards or possibly bi-directionally, starting from the first vowel of a root as illustrated below.

$$(48) \quad \left[\begin{array}{c} +B \\ \swarrow \quad \downarrow \quad \searrow \\ [m] \quad [A] \quad [z] \quad [A] \quad [m] \quad [Ar] \end{array} \right] \quad \left[\begin{array}{c} +B \quad +B \\ \swarrow \quad \searrow \quad \downarrow \\ [s] \quad [o] \quad [n] \quad [A] \quad [r] \quad [o] \end{array} \right] \text{opaque vowels}$$

$$\left[\begin{array}{c} -B \\ \swarrow \quad \searrow \\ [p] \quad [i] \quad [r] \quad [i] \quad [r] \end{array} \right] \quad \left[\begin{array}{c} -B \quad +B \\ \swarrow \quad \searrow \quad \downarrow \\ [t] \quad [ə] \quad [k] \quad [i] \quad [r] \quad [o] \end{array} \right]$$

and 矣 17,1" the Silla system preferred 矣 (17) while the Koryŏ system preferred 衣 (12).

This observation means that the so-called 'harmonic pairs,' i.e. 焉 vs. 陰, 衣 vs. 矣, are not representing opposing vowel quality but only showing two ways of dictating a given sound in different periods of time: Koryŏ and Silla.

In short, it is not a tenable hypothesis that VH *definitely* existed in the Silla period according to the observation made above, although it is quite reasonable to accept the idea that VH in LMK originated from Old Korean.

Note also that VH is one of the most characteristic features of the Altaic languages of which Korean is considered to be one. In Old Korean, nevertheless, one cannot easily find evidence for the existence of VH.

Moreover, it is not totally unreasonable to imagine a loose and incomplete stage of VH between stems and endings prior to the fifteenth century (K.-M Lee 1979: 31). In this early stage, it seems that most of the endings including particles were represented by the light vowel.

One may dare to conclude that it is not a good preconception to claim that the old stage of Korean phonology had a more complete system of VH than the later stage.

This conclusion does not mean that the VH phenomenon is less significant in Korean phonology. Just like the case that the tonal system which is not inherent in the Altaic languages may have been introduced into Korean only to disappear later, VH may also be intensified and be reduced in the history of a language.

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